

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): *An in vitro* method for the production of a homologous heart valve, comprising the steps of:

- a) providing a biodegradable support comprising a broad edge, wherein the broad edge is a suture ring,
- b) colonizing the biodegradable support with homologous fibroblast or myofibroblast cells or a combination thereof to form a connective tissue matrix, wherein the biodegradable support begins degrading at least approximately 8 days post colonization and is completely degraded no later than 3 months after colonization,
- c) optionally colonizing the connective tissue matrix with endothelial cells,
- d) introducing the connective tissue matrix, optionally colonized with endothelial cells, into a pulsatile flow chamber;
- e) adapting the connective tissue matrix to increasing flow rates to form a solid connective tissue matrix structure, wherein the flow rate is increased continuously or discontinuously, and
- f) fixing the adapted, solid connective tissue matrix structure to a slowly degradable frame construction,

wherein, before or after the fixing of the frame construction, the connective tissue matrix optionally colonized with endothelial cells is introduced into a pulsatile flow chamber in which it can be exposed to increasing flow rates, wherein the flow rate is increased continuously or discontinuously, wherein the broad edge is a suture ring, wherein the biodegradable support begins degrading at least 8 days post colonization and is completely degraded no later than 3 months after colonization, and wherein the slowly degradable frame that does not degrade prior to a year after colonization,

wherein the complete degradation of the biodegradable support and the slowly degradable frame construction provides an autologous tissue-engineered heart valve that can withstand flow rates of more than 2,000 ml/min, corresponding to the flow conditions prevailing in an adult human heart.

2. (currently amended): An *in vitro* method for the production of a homologous heart valve, comprising the following steps:

- a) providing a biodegradable support which is firmly connected to a slowly degradable frame construction, wherein the biodegradable support comprises a broad edge, and ~~wherein the broad edge~~ that is a suture ring,
- b) colonizing the biodegradable support with homologous fibroblast or myofibroblast cells or a combination thereof to form a connective tissue matrix, wherein the biodegradable support begins degrading at least approximately 8 days post colonization and is completely degraded no later than 3 months after colonization,
- c) optionally colonizing the connective tissue matrix with endothelial cells,

- d) introducing the frame construction with the connective tissue matrix,
optionally colonized with endothelial cells, connected thereto into a
pulsatile flow chamber ~~in which it can be exposed to increasing flow rates,~~
and
- e) adapting the connective tissue matrix to increasing flow rates, that
increase continuously or discontinuously to form a solid connective tissue
structure ~~increasing of the flow rate,~~

~~wherein the biodegradable support begins degrading at least 8 days post colonization and~~
~~is completely degraded no later than 3 months after colonization and wherein the slowly~~
~~degradable frame does not degrade prior to a year after colonization and~~ wherein the complete
degradation of the biodegradable support and the slowly degradable frame construction provides
an autologous tissue-engineered heart valve that can withstand flow rates of more than 2,000
ml/min, corresponding to the flow conditions prevailing in an adult human heart.

3. (previously presented): The method according to claims 1 or 2, wherein the biodegradable support comprises a biodegradable polymer matrix or an acellular biological matrix.

4. (previously presented): The method of claim 3, wherein the support comprises a polyglycolic acid (PGA), polylactic acid (PLA), polyhydroxyalkanoate (PHA), poly-4-hydroxybutyrate (P4HB) or a mixture of two or more of these polymers.

5. (previously presented): The method according to claims 1 or 2, wherein the support has a polymer density of 40 to 120 mg/cm³.

6. (previously presented): The method according to claims 1 or 2, wherein the support comprises a porous polymer having a pore size of 80 to 240 µm.

7. (previously presented): The method according to claims 1 or 2, wherein the fibers of the support have a diameter of 6 to 20 µm.

8. (previously presented): The method of claim 3, wherein the support comprises an acellular connective tissue framework of an animal or human heart valve.

9. (previously presented): The method according to claims 1 or 2, wherein the step of colonization with fibroblast or myofibroblasts cells or a combination thereof repeated 3 to 14 times.

10. (previously presented): The method according to claims 1 or 2, wherein approximately 10^5 to 6×10^8 fibroblast or myofibroblast cells or a combination thereof are employed per square centimeter of support.

11. (previously presented): The method according to claims 1 or 2, wherein the step of colonization with endothelial cells is repeated 3 to 14 times.

12. (previously presented): The method according to claims 1 or 2, wherein approximately 10^5 to 5×10^8 endothelial cells are employed per square centimeter of support.

13. (previously presented): The method according to claims 1 or 2, wherein the cells are human cells.

14. (previously presented): The method according to claims 1 or 2, wherein the cells are autologous cells.

15. (previously presented): The method according to claims 1 or 2, wherein the frame construction comprises a biocompatible material.

16. (cancelled).

17. (previously presented): The method according to claims 1 or 2, wherein the support is fixed to the frame construction by means of conventional suturing, fibrin adhesive, or a combination thereof.

18. (previously presented): The method according to claims 1 or 2, wherein flow rates of 5 ml/min to 8,000 ml/min are established in the pulsatile flow chamber.

19. (previously presented): The method according to claims 1 or 2, wherein the flow rate is increased over a period of 1 week to 12 weeks.

20. (previously presented): The method according to claims 1 or 2, wherein the initial flow rate is 50 to 100 ml/min.

21. (previously presented): The method according to claims 1 or 2, wherein the initial pulse frequency is 5 to 10 pulses/min.

22. (previously presented): The method according to claims 1 or 2, wherein the flow rate is increased to 5,000 ml/min.

23. (previously presented): The method according to claims 1 or 2, wherein the pulse frequency is increased to 180 pulses/min.

24. (previously presented): The method according to claims 1 or 2, wherein systemic pressures of 10 to 240 mm Hg are established in the pulsatile flow chamber.

25. (previously presented): An autologous heart valve that has been produced by the method according to claims 1 or 2.

26. (currently amended): An autologous heart valve having a connective tissue inner structure surrounded by an endothelial cell layer, wherein the connective tissue inner structure is fixed to a slowly degradable frame construction, wherein the frame construction comprises a broad edge wherein the broad edge is a suture ring, wherein the biodegradable support begins degrading at least approximately 8 days post colonization with the endothelial cell layer and is

completely degraded no later than 3 months after colonization with the endothelial cell layer and wherein the slowly degradable frame does not degrade prior to a year after colonization with the endothelial cell layer.

27. (previously presented): The autologous heart valve according to claim 26, wherein a collagen density of 20 to 60 % exists in the connective tissue inner structure.

28. (previously presented): The autologous heart valve according to claim 27, wherein the heart valve withstands the flow conditions in the human heart.